ANNUAL REPORT

OF

THE CURATOR

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

AT HARVARD COLLEGE,

TO THE

PRESIDENT AND FELLOWS OF HARVARD COLLEGE

FOR

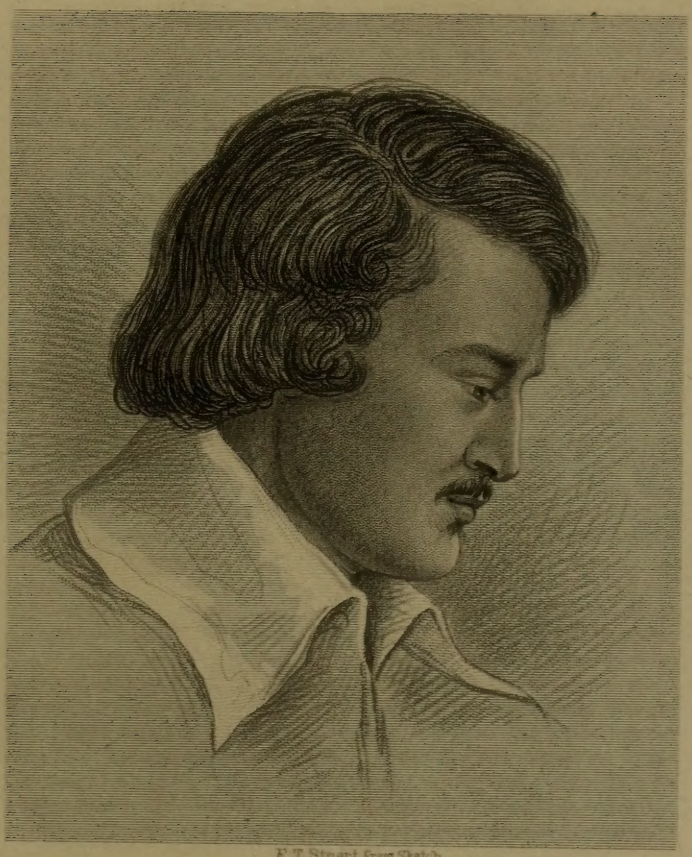
1906-1907.

CAMBRIDGE, U.S.A.:
UNIVERSITY PRESS: JOHN WILSON AND SON.
1908.

REPORTS ON THE SCIENTIFIC RESULTS OF THE EXPEDITION TO THE EASTERN TROPICAL PACIFIC, IN CHARGE OF ALEXANDER AGASSIZ, BY THE U. S. FISH COMMISSION STEAMER "ALBATROSS," FROM OCTOBER, 1904, TO MARCH, 1905, LIEUTENANT COMMANDER L. M. GARRETT, U. S. N., COMMANDING, PUBLISHED OR IN PREPARATION:—

A. AGASSIZ. V.[5] General Report on the Expedition.
A. AGASSIZ. I.[1] Three Letters to Geo. M. Bowers, U. S. Fish Com.
A. AGASSIZ and H. L. CLARK. The Echini.
F. E. BEDDARD. The Earthworms.
H. B. BIGELOW. The Medusae.
R. P. BIGELOW. The Stomatopods.
S. F. CLARKE. VIII.[8] The Hydroids.
W. R. COE. The Nemerteans.
L. J. COLE. The Pycnogonida.
W. H. DALL. The Mollusks.
C. R. EASTMAN. VII.[7] The Sharks' Teeth.
B. W. EVERMANN. The Fishes.
W. G. FARLOW. The Algae.
S. GARMAN. The Reptiles.
H. J. HANSEN. The Cirripeds.
H. J. HANSEN. The Schizopods.
S. HENSHAW. The Insects.
W. E. HOYLE. The Cephalopods.
C. A. KOFOID. III.[3] IX.[9] The Protozoa.
P. KRUMBACH. The Sagittae.
R. VON LENDENFELD and F. URBAN. The Siliceous Sponges.
H. LUDWIG. The Holothurians.
H. LUDWIG. The Starfishes.
H. LUDWIG. The Ophiurans.
——— The Actinaria.
G. W. MÜLLER. The Ostracods.
JOHN MURRAY. The Bottom Specimens.
MARY J. RATHBUN. X.[10] The Crustacea Decapoda.
HARRIET RICHARDSON. II.[2] The Isopods.
W. E. RITTER. IV.[4] The Tunicates.
ALICE ROBERTSON. The Bryozoa.
B. L. ROBINSON. The Plants.
G. O. SARS. The Copepods.
F E. SCHULZE. The Xenophyophoras. XI.[11]
H. R. SIMROTH. The Pteropods and Heteropods.
TH. STUDER. The Alcyonaria.
T. W. VAUGHAN. VI.[6] The Corals.
R. WOLTERECK. The Amphipods.
W. McM. WOODWORTH. The Annelids.

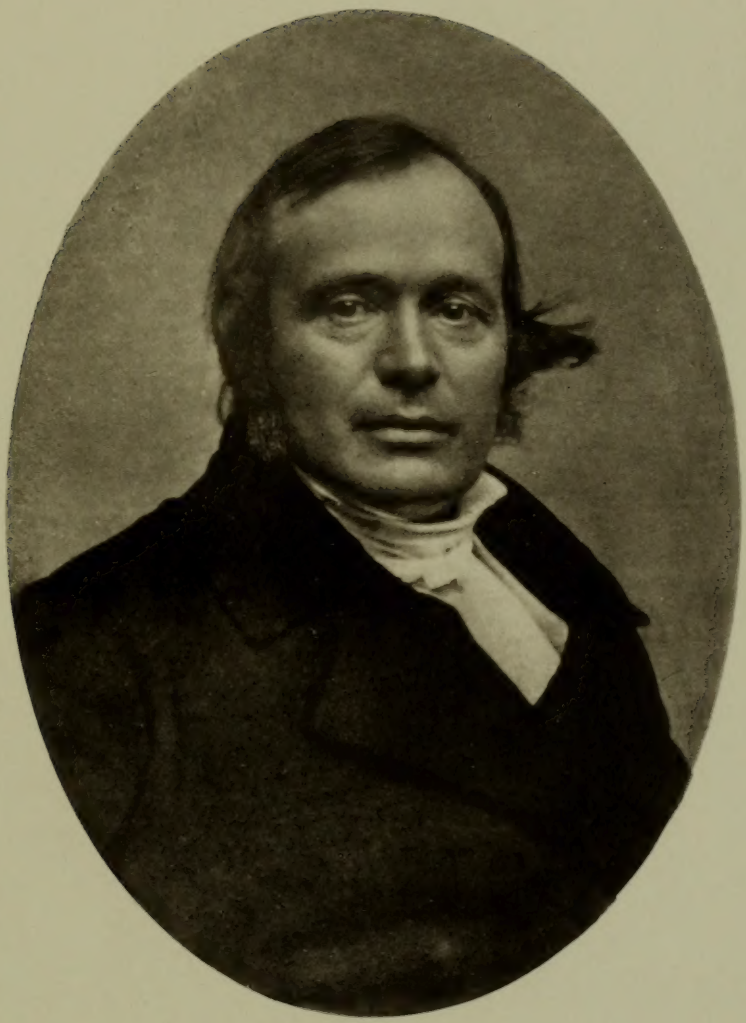
[1] Bull. M. C. Z., Vol. XLVI., No. 4, April, 1905, 22 pp.
[2] Bull. M. C. Z., Vol. XLVI., No. [illegible], 1905, 4 pp., 1 pl.
[3] Bull. M. C. Z., Vol. XLVI., No. 9, September, 1905, 5 pp., 1 pl.
[4] Bull. M. C. Z., Vol. XLVI., No. 13, January, 1906, 22 pp., 3 pls.
[5] Mem. M. C. Z., Vol. XXXIII., January, 1906, 90 pp., 96 pls.
[6] Bull. M. C. Z., Vol. L., No. 3, August, 1906, 14 pp., 10 pls.
[7] Bull. M. C. Z., Vol. L., No. 4, November, 1906, 26 pp., 4 pls.
[8] Mem. M. C. Z., Vol. XXXV., No. 1, February, 1907, 20 pp., 15 pls.
[9] Bull. M. C. Z., Vol. L., No. 6, February, 1907, 48 pp., 18 pls.
[10] Mem. M. C. Z., Vol. XXXV., No. 2, August, 1907, 56 pp., 9 pls.
[11] Bull. M. C. Z., Vol. LI., No. 6, November, 1907, 22 pp., 1 pl.



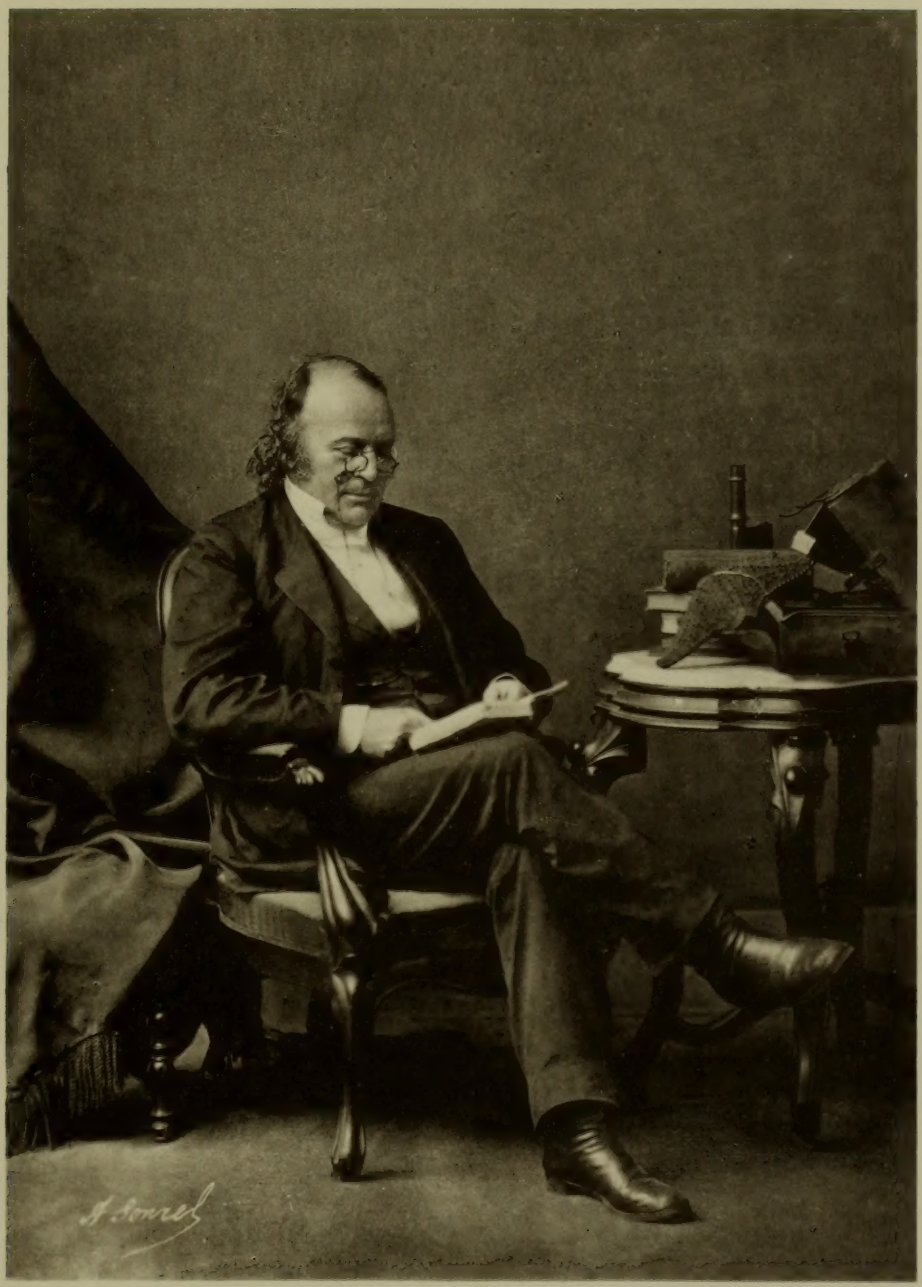
F. T. Stuart from Sketch

AGASSIZ AT THE AGE OF NINETEEN.

From a Pastel Drawing.



AGASSIZ, 1847.



AGASSIZ, 1865(?)

LIBRARY
OF THE
MUSEUM OF
COMPARATIVE
ZOOLOGY

Cockayne, Boston

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MUSEUM OF COMPARATIVE ZOÖLOGY.

Faculty.

CHARLES W. ELIOT, *President.*

HENRY P. WALCOTT. GEORGE L. GOODALE.
SAMUEL HENSHAW, *Curator.* ALEXANDER AGASSIZ, *Secretary.*

Committee on the Museum.

HENRY P. WALCOTT. GEORGE L. GOODALE.

Officers.

SAMUEL HENSHAW . . . . . *Curator.*
WALTER FAXON . . . . . *Assistant in Charge of Crustacea and Mollusca.*
SAMUEL GARMAN . . . . . *Assistant in Herpetology and Ichthyology.*
WILLIAM BREWSTER . . . . . *Assistant in Charge of Birds.*
W. McM. WOODWORTH . . . . . *Assistant in Charge of Worms.*
CHARLES R. EASTMAN . . . . . *Assistant in Vertebrate Palaeontology.*
OUTRAM BANGS . . . . . *Assistant in Charge of Mammals.*
HUBERT L. CLARK . . . . . *Assistant in Invertebrate Zoölogy.*
HENRY B. BIGELOW . . . . . *Assistant in Invertebrate Zoölogy.*
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GEORGE NELSON . . . . . *Preparator.*

WILLIAM M. DAVIS . . . . . *Sturgis-Hooper Professor of Geology.*
EDWARD L. MARK . . . . . *Hersey Professor of Anatomy.*
GEORGE H. PARKER . . . . . *Professor of Zoölogy.*
ROBERT T. JACKSON . . . . . *Assistant Professor of Palaeontology.*
ROBERT DEC. WARD . . . . . *Assistant Professor of Climatology.*
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WILLIAM E. CASTLE . . . . . *Assistant Professor of Zoölogy.*
DOUGLAS W. JOHNSON . . . . . *Assistant Professor of Physiography.*

Instructors and Assistants in the Laboratories of Zoölogy and Geology.

HERBERT W. RAND . . . . . *Instructor in Zoölogy.*
GEORGE R. MANSFIELD . . . . . *Instructor in Geology.*
E. D. CONGDON . . . . . *Austin Teaching Fellow in Zoölogy.*
A. S. PEARSE . . . . . *Austin Teaching Fellow in Zoölogy.*
G. T. HARGITT . . . . . *Assistant in Zoölogy.*
J. W. EGGLESTON . . . . . *Assistant in Geology.*
F. H. LAHEE . . . . . *Assistant in Geology.*
B. M. VARNEY . . . . . *Assistant in Physiography and Meteorology.*

REPORT.

To the President and Fellows of Harvard College:—

It is well to recall in the centenary year of the founder of the Museum of Comparative Zoölogy the indebtedness this Museum owes, in common with similar institutions, to the genius of Louis Agassiz. With broad interests in the investigation, instruction, and the popularization of natural science, he planned the division of this Museum into research collections and into collections for exhibition, at a time when large collections of specimens were useful to professional naturalists alone. For the research collections his zeal knew no bounds, and the investigator in problems in variation, for instance, as a result of that zeal, finds to-day, in certain fields, extensive series of specimens not easily duplicated elsewhere. For purposes of instruction and for the popular exhibition of animal life, Professor Agassiz departed from the usual custom of one great systematic series with very many specimens crowded together, and established the principle of the selection of a small number of characteristic forms, associating recent species and their skeletons in juxtaposition with fossil forms. Moreover, Professor Agassiz's three ideas — first, *synoptic* collections showing the principal types of form and structure; secondly, *systematic* collections with a more extended, though limited, series of typical specimens; and thirdly, *faunal* collections, where the main facts of the geographical distribution of the animals of the earth and ocean are shown — have the same interest and importance they had when the Museum was founded in 1859, and have given the Museum of Comparative Zoölogy an individuality and character of its own.

The late Dr. Charles F. Folsom was a member of the Committee appointed by the Overseers to visit the Museum from 1891 until his death, August 20, 1907; he was also a member of the Committee on zoölogical instruction for the year 1906–1907. Dr. Folsom's interest in the work of these committees was genuine and disinterested. He was instrumental in securing for the Mu-

seum the Edward A. and Outram Bangs collection of American mammals.

In the Academic year 1906–1907 twelve courses in Zoölogy were given by Professors Mark, Parker, Jackson, Castle, and Dr. Rand to two hundred and seventy students in Harvard University, and five courses were given to thirty-three students of Radcliffe College. The Assistants in the University courses were Messrs. A. M. Banta, H. B. Bigelow, W. S. Burgess, E. D. Congdon, H. S. Davis, C. O. Esterly, J. A. Long, F. F. Marshall, R. C. Mullenix, and W. E. Wing.

Mr. Manton Copeland assisted in two of the courses given in Radcliffe College.

Five students, while at work at the Bermuda Biological Station for Research, received aid from the Humboldt fund.

The instruction in the Department of Geology and Geography was given by Professors Davis, Jackson, Ward, Woodworth, Johnson, and Dr. Mansfield, assisted by Messrs. J. W. Eggleston, F. H. Lahee, H. E. Merwin, E. J. Saunders, and F. H. Sawyer; eighteen courses were given to three hundred and seventeen students of Harvard University, and four courses to twenty-five students in Radcliffe College.

Mr. F. H. Lahee held the Josiah Dwight Whitney scholarship for the year.

In December, 1906, the Faculty appointed Mr. R. W. Sayles Assistant in charge of the exhibition collections in the Geological section of the Museum.

To Mr. Agassiz the Museum is indebted for a model of Bora Bora, a masterly piece of workmanship by Mr. George Carroll Curtis. In November, 1899, while exploring the Tropical Pacific, Mr. Agassiz visited Bora Bora, the most striking of the Society Islands, and an excellent type of the structure and mode of formation of the coral reefs of the group. At the instance of Mr. Agassiz, Mr. Curtis went to Bora Bora in 1904, spending several months there, and from personal surveys and soundings, supplemented by other accessible data, executed this model. Bora Bora is approximately five by three miles in diameter; its central volcanic peak rising to a height of over 2,500 feet and surrounded by a wide lagoon, the wide barrier-reef flat, the narrow fringing reef, and the steep sea slope, are all well brought out by Mr. Curtis. The scale employed is 1–3,600. With the eye at sea level, the natural elevation is obtained.

To install this model in the centre of the Coral room, the Crawfordsville series of crinoids has been removed to new cases built around the rails of the gallery devoted to echinoderms.

From Mr. William Barbour's generous gift for present use, we have obtained, in addition to the egg of the Great Auk mentioned in the Report for 1905–1906, the following specimens: — a series of Hawaiian fishes mounted by Mr. Sherman F. Denton and on exhibition in the Pacific room; a very nearly complete skeleton of the Dodo from Mauritius; an exceptionally large and perfect egg of *Aepyornis* (*? maximus*); an extensive series of bones of the Great Auk from Funk Island; a fine collection of European myriopods collected and identified by Dr. Karl W. Verhoeff of Dresden; and an interesting series of specimens, chiefly invertebrates, selected from Alan Owston's stock. In addition to the above mentioned material, Mr. Barbour's gift has enabled the Museum to build and equip sixteen large storage cases for the Ornithological department.

From Mr. Thomas Barbour's collecting trip to India, Burmah, the Dutch East Indies, and New Guinea, the Museum will benefit largely. Mr. Barbour, though chiefly interested in the lower vertebrates, devoted his energies in a most catholic spirit to other groups, and got together large series of specimens, including echinoderms, crustaceans, spiders, insects, and other invertebrates, also birds and mammals, all of which he has presented to the Museum, and upon which we hope to publish several Bulletins. Mr. Barbour has given us also a number of vertebrates selected in London, to fill gaps in our exhibition series, and some choice specimens which he purchased in Yokohama for our research collections.

The generosity of the New York Zoölogical Society, through its Director, Dr. W. T. Hornaday and the Curator of reptiles, Mr. R. L. Ditmars, in presenting valuable material, has been acknowledged for many years. This material, mounted by its preparator, Mr. George Nelson, has enabled the Museum to improve its exhibition series of reptiles. In the Systematic collection, in the North American collection, and especially in the collection devoted to the Indo-Asiatic fauna, this improvement may be noted to a very marked degree; the Indian Python, *P. molurus*, 13 feet long, and the Reticulated Python, *P. reticulatus*, nearly 22 feet in length, show, in a most realistic manner, the power and magnificence of these monstrous animals.

When in Iceland in 1905, Messrs. J. W. Hastings and L. J. de G. de Milhau were good enough to arrange to have the Museum receive a series of the birds of Iceland, and we have already as a part of their gift thirty birds, either mounted or as skins.

By the kind offices of Dr. W. E. Castle, the Museum has added to its special collections two sets of specimens elucidative of Dr. Castle's work in inheritance. One of these, a series of five rabbits, shows the blending inheritance of ear characters with the alternative inheritance of coat colors, and the other, a series of Guinea-pigs, represents the fixation of an atavistic coat character, similar to that of the wild Cavy, but obtained by a cross between two simple color forms. Both of these series have been prepared for exhibition by Mr. Nelson.

The Museum is indebted to the U. S. National Museum for a series of ninety slides of the Foraminifera, (Albatross 1891 expedition), which formed the basis of the report of Goes, (Bull. M. C. Z., March, 1896, vol. 29, no. 1); this series is identified and labelled.

The Museum is likewise indebted to Dr. E. W. Dwight for a specimen of the Hawksbill turtle, to Dr. R. T. Jackson for some interesting fossils, and to Mr. Junius Henderson for some fossils and recent shells.

Many of the North American mammals on exhibition have been in the cases for a quarter of a century or more, so that the substitution of more modern mounts from fresh skins is desirable; this work is being carried on as opportunities occur, and two recent accessions, a female Caribou, *Rangifer caribou*, presented by Dr. H. B. Bigelow, and a young fawn, *Odocoileus virginianus borealis*, a gift of Mr. Thomas Emerson Proctor, are noteworthy.

Two new cases have been built in the African room, and the rearrangement and labelling of the specimens has been continued; new accessions include a fine male Lion (purchased) and a specimen of the striking White-tailed Guereza, *Colobus caudatus*, a gift of Mr. Thomas Barbour.

In the South American room a large floor case has been built; for the present, this case will be devoted, one half to animals peculiar to the Galapagos Islands, and the remaining half to the animals of the West Indies. Some progress has been made in the selection and installation of the specimens for both of these exhibits.

A series of specimens illustrative of bird architecture has been

placed on exhibition in the room with the Scott collection of North American birds. Though as yet limited in extent and incomplete in some respects, the series has proved of great popular interest. The method of mounting is extremely simple, wholly without accessories, and yet one that allows a considerable number of nests and birds to be shown in a limited space without a crowded effect. The nests and accompanying birds have been mounted by Mr. Nelson, who has devoted not a little time towards collecting new material. For other contributions towards this exhibit, the Museum is indebted to Mrs. E. H. Hall, Messrs. Thomas Barbour, H. B. Bigelow, H. A. Purdie, G. P. Putnam, Roland Thaxter, and G. H. Thayer.

The room devoted to animals under domestication has been opened, and the specimens ready for exhibition have been installed.

Work on the material selected for exhibition in the Mesozoic room is well in hand, but the opening of the room is necessarily deferred until next year.

Nearly the whole of the research series of fossil crinoids has been transferred to the new room above the Divinity Avenue entrance hall; another storage case will be required before all the fossil echinoderms can be brought together.

The Museum is under obligations to Messrs. Faxon, Brewster, Woodworth, Bangs, and Bigelow for the care they have taken of the collections under their charge. The accompanying reports of the Assistants give the usual details as to the additions received and the work accomplished during the year.

Mr. Agassiz spent about two months of exploration in the West Indies in the steam yacht "Virginia." Starting from Porto Rico, the "Virginia" worked as far south as Grenada and thence back to Santiago de Cuba. Considerable surface and intermediate collecting was done; the cruise also enabled Mr. Agassiz to accumulate additional information concerning the structure and history of the islands, and to check the results of his earlier investigations among them. Mr. Agassiz was accompanied by Drs. Woodworth and Bigelow as Assistants.

The Library contains 43,518 volumes, and 38,026 pamphlets, 1,097 volumes, and 1,704 pamphlets having been added during the year.

Three numbers of the Memoirs, thirteen numbers of the Bulletin, and the Annual Report, a total of 658 (112 quarto, 546

octavo) pages, with 118 (65 quarto and 53 octavo) plates have been issued and are listed on pages 42–43. The three Memoirs and six of the Bulletins contain reports on the scientific results of explorations carried on under Mr. Agassiz's supervision; one Bulletin is a contribution from the Geological department; and seven Bulletins are reports upon various Museum collections.

The usual appropriation, $350, to assist in the publication of Contributions offered by the Zoölogical and Geological laboratories has been continued by the Corporation.

SAMUEL HENSHAW.

REPORT ON THE ZOÖLOGICAL LABORATORY.

By E. L. Mark.

For the first time it becomes my duty to record the death of an officer of the University connected with the Department of Zoölogy. Dr. Charles Follen Folsom, a member of the Committee appointed by the Overseers to visit the Zoölogical department, died in New York on August 20, 1907.

TABLE I.

Courses 1906–07.	Grad.	Sen.	Jun.	Soph.	Fresh.	Spec.	Bussey.	Total.
Zoölogy 1	3	6+*1*	13+*2*	33+*8*	63+*1*	18	1	137+ *12* = 149
" 2			11+*2*	6+*3*	7+*1*	1		25+ *6* = 31
" 3	3	8	5+*2*	2+*1*	1	1		20+ *3* = 23
" 4	2	1		2				5 = 5
" 5	5	2		1				8 = 8
" 9*a*	8							8 = 8
" 9*b*	2							2 = 2
" 10*a*	8							8 = 8
" 10*b*	7+*1*	1						8+ *1* = 9
" 14	6	2	*1*					8+ *1* = 9
" 16	7	1	*1*					8+ *1* = 9
" 20	9							9 = 9
Sums	60+*1*	21+*1*	29+*8*	44+*12*	71+*2*	20	1	246+*24* = 270

TABLE II.

Courses 1906–07.	Grad.	Sen.	Jun.	Soph.	Fresh.	Spec.	Total.
Zoölogy 1	1	1	2	4	10	1	19
" 2	1	1			3		5
" 3	2						2
" 5	1					1	2
" 16	3	1				1	5
Sums	8	3	2	4	13	3	33

The accompanying tables show the number of students attending each of the courses offered by the Department during the year 1906–1907, the numbers printed in italics referring to students of

the Lawrence Scientific School, or the Graduate School of Applied Science. The first table gives the indicated information for Harvard, the second for Radcliffe.

Except for courses which alternate with each other, the formal instruction has not been materially changed from that of the preceding year.

Professor Parker had as chief assistant in the laboratory for Zoölogy 1 in Harvard Mr. E. D. Congdon, and as sub-assistants Dr. H. B. Bigelow, Messrs. W. S. Burgess, H. S. Davis, F. F. Marshall, and W. E. Wing. The laboratory work in Radcliffe was in charge of Mr. M. Copeland, as assistant.

Assistant Professor Castle thinks that a decrease in the number of students in Zoölogy 2 may have some connection with the new policy regarding tuition fees for extra courses. The chief assistant in this course was Mr. A. M. Banta, the sub-assistants being Messrs. E. D. Congdon, H. S. Davis, and R. C. Mullenix. Mr. M. Copeland was laboratory assistant for the course in Radcliffe College.

The number of students in Zoölogy 3, under Dr. Rand, was precisely the same as in 1905–1906, but of these one completed the work of the first half-year only, and another was a special student of maturity who did the work of the first half-year without taking examinations or receiving credit. The regular assistant in the laboratory was Mr. C. O. Esterly, and Mr. J. A. Long also gave some time to assisting in this course. There were two students in the Radcliffe course and no assistant in the laboratory.

There were only slight changes in Zoölogy 4, the course being carried on by Professor Mark and Dr. Rand, as in previous years. In accordance with the plan adopted when Zoölogy 6 was announced, the lectures in Zoölogy 5 dealt with the broad outlines of vertebrate development, the subject of organogeny being reserved for the alternating course (Zoölogy 6). As usual, in the lectures most attention was given to the parts least readily mastered from text-book reading, and to the discussion of special questions. The laboratory work, as hitherto, was conducted by Dr. Rand, and was largely devoted to a study of the early stages of the chick. In one particular it was modified from that of former years; previous to the study of incubated hens' eggs considerable time was given to a study of the ovary of the Guinea-pig, and to an examination of the unincubated hens' eggs — both sections and dissections.

With the return of Assistant Professor Jackson, after a year's leave of absence, the courses in Palaezoölogy were resumed. Both Zoölogy 9*a* and Zoölogy 9*b* had graduate students only.

At the suggestion of the Committee on Instruction, certain courses — in which the laboratory work consisted in the investigation of a separate problem by each student in the class — were transferred from the middle group of studies to that which is designated as "primarily for graduates." These were courses 10*a*, 10*b*, 11*a*, 11*b*, 15 and 16.

The nature of the courses designated as Zoölogy 10*a* and 10*b* — conducted by Assistant Professor Castle — is succinctly set forth in the pamphlet of the Department for 1906–1907. The lectures, owing to the rapid advance of knowledge in the subjects treated, require frequent revision. Some of the topics studied by the students in these courses were color and size inheritance in rats and rabbits, and the physiological differences between different color varieties of Guinea-pigs. Some of the results obtained will be incorporated in future publications.

Following the plan adopted the previous year, the subject matter of Zoölogy 13, by Professor Parker, was so divided that the new half-course, Zoölogy 14, deals with muscular and sustentative tissues, while Zoölogy 13 is now to be limited to epithelial and nervous tissues. The lectures of Course 14, though based on a part of those of Course 13, have been expanded and are essentially new.

In Zoölogy 16, also by Professor Parker, each student was assigned a special topic for investigation. Of these, two have yielded results that are in preparation for publication. Two students studied the same subject in this course as that on which they were working in Zoölogy 20. Five students took the course in Radcliffe; two of them wrote theses, and three elected to do the laboratory work. Of the latter, two obtained results that will be offered for publication.

Of the eleven men who began researches in Zoölogy 20, two withdrew early in the year, one to do his work in another department of the University, the other for financial reasons. Seven of those who continued their work were under the direction of Professor Mark, one under Professor Parker, and one under Professors Mark and Parker jointly. Three students presented theses that were accepted, and passed the examinations for the degree of Ph.D.; the degrees were conferred at Commencement in June,

1907. The names of the students and the titles of their theses follow: Arthur Mangun Banta, *A comparison of the reactions of a species of terranean with those of a subterranean isopod;* Herbert Spencer Davis, *Spermatogenesis in Acrididae and Locustidae;* Calvin Olin Esterly, *The light-recipient organs of the copepod Eucalanus elongatus.*

During the year Professor Parker has given much time to the interests of the Seventh International Zoölogical Congress, as chairman of the executive committee.

Investigations in heredity — in which the Carnegie Institution of Washington is coöperating with the Laboratory — have been carried on by Assistant Professor Castle and by Professor Mark. In connection with this work Professor Castle has published contributions from this Laboratory No. 188 (with H. MacCurdy), and two papers in Science (see p. 14). The results of these investigations have been presented by Professor Castle before the National Academy of Sciences, and the American Society of Zoölogists, likewise addresses before the Sigma Xi Society of the University of Michigan and the American Breeders' Association. A course of four lectures on heredity was also delivered by him before the Brooklyn Institute of Arts and Sciences.

Dr. Rand has made considerable progress with two lines of work on earthworms, and investigations on reactions to wounding of the tentacles in actinians.

Professor Mark gave some time to the perfection of a machine for cutting the wax plates extensively used by morphologists in making models by reconstruction from microscopic sections. The cutting is rapidly and satisfactorily accomplished by the use of a fine platinum wire heated by an electric current and made to execute rapid vertical excursions by attachment to an ordinary sewing machine. In working out the details of this machine he had the valuable assistance of Mr. J. A. Long. The machine was exhibited in operation at the meeting of the National Academy in Boston in November, and at the meeting of the Association of American Anatomists in New York in December.

The inability of the Colonial Government of Bermuda to carry out its plan of erecting a building to accommodate the Public Aquarium and the Biological Station for Research, — owing to financial conditions following a reduction of the naval and military forces on the Islands, — caused an interruption in the work of the Station for the summer of 1906. Early in 1907, however,

the Bermuda Natural History Society secured control of an island in Hamilton Harbor formerly used by the British government for the storage of munitions of war. The island is some three acres in extent, and has about a dozen substantial buildings. These have been converted into a public aquarium, laboratories for biological work, and quarters for lodging. Professor Mark was invited to take charge of the Station for Research. The session extended from June 21 to August 7. Fourteen persons were enrolled, eight of whom were or are connected with Harvard University. One of the fourteen enrolled was Professor Fisk of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, who was detailed by the Director, Dr. L. A. Bauer, to continue and supplement the magnetic survey made in 1905 by Mr. John L. Cole, an account of which was given in my report for the year 1904–1905. Professor Fisk's work was directed chiefly to determining the dip and intensity of magnetic attraction at a number of important stations. As Professor Mark was unable to sail for Bermuda before July, Dr. Rand was in charge of the Station from June 21 to July 5.

Five persons received aid from the Humboldt fund to the amount of $295.70 in the summer of 1907, while working at the Bermuda Station.

The Carnegie Institution of Washington made a grant of $300 to Professor Mark to aid in carrying on certain embryological investigations which required an unusual outlay for material.

The Zoölogical Club held regular meetings on the afternoons of Fridays, at which twenty-one original papers were presented and about thirty other pages were reviewed. The subjects to be presented were, as usual, announced in advance in the calendar of the University Gazette.

Publications. August 1, 1906–July 31, 1907.

Contributions from the Zoölogical Laboratory.

180. Parker, G. H. and Metcalf, C. R. — The reactions of earthworms to salts: a study in protoplasmic stimulation as a basis of interpreting the sense of taste. *Am. journ. physiol.*, September, 1906, vol. 17, p. 55–74.

181. Woodworth, C. W. — The wing veins of insects. *Univ. California publ. Agr. exp. sta. Tech. bull. Entomology,* September [October], 1906, vol. 1, p. 1–152.

182. Mast, S. O. — Light reactions in lower organisms. I. Stentor coeruleus. *Journ. exp. zoöl.*, September, 1906, vol. 3, p. 359–399.

183. Parker, G. H. — The influence of light and heat on the movement of the melanophore pigment, especially in lizards. *Journ. exp. zoöl.*, September, 1906, vol. 3, p. 401–414.

184. Larrabee, A. P. — The optic chiasma of teleosts: a study of inheritance. *Proc. Amer. acad. arts and sci.*, October, 1906, vol. 42, p. 215–231.

185. Cole, L. J. — An experimental study of the image-forming powers of various types of eyes. *Proc. Amer. acad. arts and sci.*, January, 1907, vol. 42, p. 333–417.

186. Esterly, C. O. — The reactions of Cyclops to light and gravity. *Amer. journ. physiol.*, February, 1907, vol. 18, p. 47–57.

187. Mark, E. L. — An electric wax-cutter for use in reconstructions. *Proc. Amer. acad. arts and sci.*, March, 1907, vol. 42, p. 627–636.

188. MacCurdy, H., and Castle, W. E. — Selection and cross-breeding in relation to the inheritance of coat-pigment and coat-patterns in rats and Guinea-pigs. *Publ.* 70 *Carnegie inst. Washington*, May, 1907, 50 pp., 2 pls.

189. Rand, H. W. — The functions of the spiracle of the skate. *Amer. nat.*, May, 1907, vol. 41, p. 287–302.

190. Mark, E. L., and Copeland, M. — Maturation stages in the spermatogenesis of Vespa maculata Linn. *Proc. Amer. acad. arts and sci.*, June, 1907, vol. 43, p. 69–74.

Contributions from the Bermuda Biological Station for Research.

9. Congdon, E. D. — The hydroids of Bermuda. *Proc. Amer. acad. arts and sci.*, January, 1907, vol. 42, p. 461–485.

10. Blackman, M. W. — The spermatogenesis of the myriapods. V. On the spermatogenesis of Lithobius. *Proc. Amer. acad. arts and sci.*, February, 1907, vol. 42, p. 487–518, 2 pls.

W. E. Castle. — Yellow mice and gametic purity. *Science*, 31 August, 1906, new ser., vol. 24, p. 275–281.

On a case of reversion induced by cross-breeding and its fixation. *Science*, 25 January, 1907, new ser., vol. 25, p. 151–153.

REPORT OF THE STURGIS-HOOPER PROFESSOR OF GEOLOGY.

By William M. Davis.

The addition of Assistant Professor Johnson to the departmental staff has made it possible to transfer the course on the Physiography of the United States (Geology 6) to his charge, leaving in my hands for the past year the advanced course in Physiography (Geology 20 *a*) which has been conducted on the same plan as heretofore, except that a larger amount of time than usual has been given to individual conferences. The topics treated were: the Italian Riviera and the cliffs of Normandy, by Mr. E. J. Saunders, who had visited those typical coasts during a summer journey abroad; the Wind-river range of Wyoming, by Prof. E. G. Woodruff, who had studied these mountains the previous summer in connection with work for the United States Geological Survey; the physiography of the New York Central and the Pennsylvania railroad routes from New York to Chicago, by Mr. A. S. Cobb, who made a trip along the two lines, with numerous stops on the way, in connection with his study of their economic relations; the features of central England treated as a belted coastal plain, and of central Sweden treated as a district of faulted blocks, once base-levelled and now redissected, by Mr. W. N. Johnstone; the state and national boundaries of the United States, by Mr. A. T. French; the relation of irrigation to physiography, by Mr. J. H. Giles; and the physiographic factors that are significant as plant controls, by Mr. H. E. Merwin. Several of the theses in which the results of these studies were presented at the close of the year were well advanced; yet, as has usually been the case, it appears practically impossible for a student who gives no more than a quarter of his time to topics such as those stated above, to complete an essay ready for publication within the academic year. I believe that it would be more profitable if half or more than half of the student's time were given to

this course, and if the completion of a publishable essay, creditable alike to the student and to the Department, were made a requirement.

In association with the advanced course on Physiography, I held many conferences with Mr. Ellsworth Huntington, who as Hooper Fellow was writing an account of his recent travels in central Asia, and discussing the records of subrecent changes of climate and their effect on human history.

Two afternoon lectures were given on the preparation of geological diagrams, as a contribution to instruction in technique, with which most of our students have insufficient acquaintance.

During the absence of Prof. J. H. Wright, Dean of the Graduate School of Arts and Sciences, I served as Acting Dean.

The New England Intercollegiate Geological Excursion being now well established as an annual autumnal field reunion of professors and advanced students of geology in our schools and colleges, a similar reunion of teachers and students of geography was initiated in the spring, as a means of bringing about further improvements in geographical teaching. A day's meeting, with morning and afternoon sessions, was held in Cambridge, with the decision to meet again in coming years.

Much time was given in the spring and summer to the preparation of a series of practical exercises in physical geography, for use in schools. There has been increasing need of such exercises for a number of years past, in order to give a more disciplinary quality to the study; a quality which it sadly lacks to-day, if one may judge by the very disappointing results of our admission examinations in physiography. A serious difficulty was encountered in the preparation of the ideal diagrams of typical land forms, on which a number of the exercises are based. No professional artist could be found who combined a sufficient knowledge of the subject with a trained delicacy of handiwork, and as a result I have had to prepare all the drawings myself, with what success remains to be seen.

Publications. August 1, 1906–*July* 31, 1907.

The mountains of southernmost Africa. *Bull. Amer. geogr. soc.*, October, 1906, vol. 38, p. 593–623.

The physical factor in general geography. *Educational bimonthly*, 1906, vol. 1, p. 112–123.

Professor Shaler and the Lawrence Scientific School. *Harvard eng. journ.*, 1906, p. 129–138.

Biographical memoir of George Perkins Marsh. 1801–1882. *Biogr. mem. Nat. acad. sci.*, 1906, p. 71–80; portr.

[Review of] Wright's "Scientific confirmations of Old Testament history." *Christian register*, 14 March, 1907. *Boston transcript*, 16 March, 1907.

The place of coastal plains in systematic physiography. *Journ. geogr.*, 1907, vol. 6, p. 8–15.

The terraces of the Maryland coastal plain. Review of "Pliocene and Pleistocene." Maryland geological survey. *Science*, 3 May, 1907, new ser., vol. 25, p. 701–707.

REPORT OF THE DEPARTMENT OF GEOLOGY AND GEOGRAPHY.

By Jay B. Woodworth.

The accompanying table shows the number of students taking the courses offered by this Department in 1906–1907. In estimating the resort to the Geological section of the Museum the number of students (21) enrolled in courses 10 and 20 *b*, given in the Mining Building, should be deducted; and eight students who took Mining 28 the first half-year in the Geological laboratory should be added.

Courses	Harvard College Reg. Sp.	L.S.S.	Bussey.	Radcliffe.†	Graduate School. ‡	Total.
Elementary						
A[1]	34 + 7 = 41	6	1	(5)	0 + 1 = 1	49
B[2]	15 + 2 = 17	2				19
1[1]	2 + 1 = 3	0				3
2[2]	4 + 0 = 4	3			1 + 0 = 1	8
4[1]	54 + 10 = 64	29		(9)	1 + 0 = 1	94
5[2]	31 + 8 = 39	12		(8)	0 + 0 = 0	51
	140 + 28 = 168	52	1		2 + 1 = 3	224
Advanced						
6[2]	15 + 4 = 19	3	1		2 + 1 = 3	26
8[1]	7 + 1 = 8	1		(3)	1 + 0 = 1	10
10	11 + 3 = 14	5			1 + 0 = 1	20
11	1 + 1 = 2	1			1 + 0 = 1	4
15	0 + 0 = 0	1			2 + 0 = 2	3
16[2]	7 + 1 = 8	3			2 + 0 = 2	13
18	0 + 0 = 0				0 + 0 = 0	0
19	1 + 0 = 1				1 + 0 = 1	2
22	1 + 0 = 1	1			1 + 0 = 1	3
	43 + 10 = 53	15	1		11 + 1 = 12	81
Graduate						
20*a*	3 + 0 = 3	1			3	7
20*b**	1 + 0 = 1				0	1
20*c*	0 + 0 = 0				1	1
20*d*	0 + 0 = 0				0	0
20*e*	1 + 0 = 1				1	2
	5 + 0 = 5	1	0		5 + 0 = 5	11
	188 + 38 = 226	+ 68	+ 2	(25)	18 + 2 = 20	316

* Given in the Rotch building. † Separate classes, not counted in totals.
‡ The first column refers to Arts and Science, the second to Applied Science.

In this table students registered in the Graduate School of Applied Science appear for the first time. A marked change in the relative numbers of those registered under Harvard College and the Lawrence Scientific School appears in the undergraduate courses, owing to the transfer of many students from the latter to the former grouping under the new regulations for obtaining the S.B. degree in Harvard College.

Details as to the courses of instruction will be found in the abstracts of the reports of the departmental staff (p. 23–27). Messrs. J. W. Eggleston, F. H. Lahee, H. E. Mervin, E. J. Saunders, and F. H. Sawyer assisted in the several courses.

The principal increment in the resources of the Department for the past year arises from its sharing with the Division of Geology in the benefits of the Shaler Memorial Fund. The terms of administration of this fund are set forth in the following extract from the records of the President and Fellows of Harvard College at their meeting of March 11, 1907: —

The Treasurer presented the following communication specifying the terms governing the Shaler Memorial Fund, the receipt of a part of which was reported at the meeting of January 14, 1907: —

Boston, Mass., March 1, 1907.

More than seven hundred and sixty (760) alumni of Harvard University unite in giving to the President and Fellows of Harvard College the sum of thirty thousand five hundred dollars (30,500.00) to establish a

"Shaler Memorial Fund"

in commemoration of the long services of Professor Nathaniel Southgate Shaler and of the great affection in which he was held by his many students and friends.

The subscribers to this fund have left the designation of its use to the undersigned committee; and the committee, after consideration of various projects, concludes that the memorial object of the fund will be best attained — first, by setting aside a sum with which the Corporation shall procure a memorial tablet to be put in the Geological section of the University Museum, or some other suitable place as may be designated by the Corporation; and second, by using the income of the balance of the fund for the benefit of the Division of Geology in support of original research and in the publication of the results of research, under the following conditions: —

The researches here contemplated are to be undertaken by persons nominated by the Committee of the Division of Geology and appointed

by the Corporation, whether officers or students of Harvard University or not. The subject and the locality or field of research are to be approved by the Division Committee, preference being given to studies of an advanced and original character. The sums of money allotted from the income for research are to be determined by the Division Committee with the approval of the Corporation. The money appropriated for such work from the income of the fund shall be in addition to the salary that would be otherwise paid to the person or persons undertaking it; and any work or journey thus supported in whole or in part shall be carried on under the name "Shaler Memorial Research" or "Shaler Memorial Expedition."

The publications here contemplated are to include the results of original research carried on with the income of the fund, or independently of such aid; but the results must in all cases receive the approval of the Division Committee as to subject and presentation — though not necessarily as to the conclusions stated — before they are accepted for publication.

All publications thus approved, whether appearing in independent volumes or in some established journal, shall bear the general title, "Shaler Memorial Series." The allotment of money for publication shall be determined in the same way as for research.

Beneficiaries under the fund, either as to research or publication, may be invited by the Division Committee to give one or more public lectures in Cambridge on the results of their studies, under the general title "Shaler Memorial Lectures," but no additional payment is to be made for these lectures.

The income of the fund may be allowed to accumulate in case an investigation, expedition, or publication of considerable magnitude is contemplated by the Division Committee, but it is not desired that such accumulation shall continue beyond a reasonable period of time.

In addition to any future subscriptions that may be added to the fund, such part of the income as shall constitute one per cent of the principal may be annually added to the principal; but action in this regard is left to the discretion of the Corporation.

It is wished that the fund shall be administered in accordance with the conditions indicated above, so long as the objects there stated shall be regarded as desirable by the Committee of the Division of Geology; but if the time should come when such objects are no longer held by them to be desirable, the income may be applied to such other objects as the Corporation may determine; providing only that it shall be administered as a memorial of Nathaniel Southgate Shaler.

(Signed) Robert Winsor,
W. M. Davis,
Edward W. Atkinson.

Whereupon it was

Voted, That the Shaler Memorial Fund be gratefully accepted upon the terms and for the uses stated in the foregoing communication, and that the President and Fellows hereby record their satisfaction in the possession of such an enduring and fruitful memorial of Professor Shaler.

The income of this fund will go far towards maintaining those field investigations on the part of the teaching staff which Professor Shaler ever insisted upon and will also tend to place the Division of Geology in a position to undertake independent and somewhat extended investigations. A part of the gift, it is understood, is to be applied to the erection of a suitable memorial tablet to Professor Shaler. It is probable that the income of the fund will be applied in 1908 towards an expedition to Brazil to investigate the Permo-Carboniferous conglomerates of that country in their bearing on late Palaeozoic glaciation, a subject quite in keeping with Professor Shaler's early writings upon recurrent glaciation in the past.

Through the generosity of certain members of the Visiting Committee, the Department has been able to order for the Geological section of the Museum a 100 kilogram Bosch-Omori seismograph. This instrument, constructed by Messrs. J. and A. Bosch, of Strassburg, Germany, is designed to register all movements of the earth near or distant. It magnifies horizontal oscillations one hundred times, and by this means it is hoped to obtain satisfactory records of many of the smaller earthquake shocks which originate in New England and adjacent regions.

By an arrangement with Professor Wolff in behalf of the Department of Mineralogy and Petrography and by means of a grant from the Corporation, the Department has had for three fifths of his time the services of an expert laboratory aid and custodian of teaching materials, Mr. George Marsh Flint.

The Geological Conference was maintained during the year. Twenty-seven " papers " were presented by instructors, students, and former members of the University.

Professors Davis and Johnson gave two lectures in the University Museum Sunday afternoon course. Both lectures were well attended.

By means of a grant of $250 from its unrestricted fees and the use of fees received for the course from students the Department was able to send a field party to Montana. This party, under the

guidance of Dr. Mansfield, fitted out at Bozeman on the 2d of July and carried on an examination of the Bridger Range, and later with Professor Wolff a study of the Crazy Mountains, for purposes of geological instruction. Ten Harvard students took this course.

As a matter of record it should be noted that the Department of Mining and Metallurgy, which began under the auspices of this Department and later formed a successful Department in the Division, was this year constituted into an independent Division. As a reminder of the former relations of the two Departments we still retain the instruction in economic geology, given in the laboratories of the Mining Department, and also the field course in geology for mining students, conducted in our laboratory.

The Sub-committees of the Department present the following reports: —

The Committee on the Gardner Collection of photographs (Messrs. Woodworth, Ward, and Johnson) report as follows:

State of Collection, July 1.	Photographs.	Slides.	Negatives.
Accessions since last report	111	387	0
Unidentified views	253	30	0
Duplicates	144	51	0
Broken	0	1	0
Condemned	0	0	0
Last accession number	5812	5128	0
Number now in collection	5730	5442	1236

The accessions during the year include a set of fifty-two lantern slides from negatives made by Mr. Ellsworth Huntington on his journeys in Central Asia, and a set of remarkable photographs of water-spouts; some views of the 1906 eruption of Vesuvius taken by Mr. E. J. Saunders. The collection of slides having outgrown the cases previously constructed, a large case on a quite different plan has been built with a capacity for holding 13,550 standard American lantern slides, 10,000 of which may be placed so as to be readily accessible on the top of the case. Dr. Mansfield gave a part of his time during the year to the cataloguing and care of the collection. Hereafter this work will be done by Mr. Flint.

The Committee on the Geological Museum (Messrs. Woodworth, Jackson, and Wolff) report that Mr. R. W. Sayles was appointed Assistant in charge of the exhibition collections by the

Faculty of the Museum of Comparative Zoölogy ; a few purchases and additions of materials by gift have been made. The Museum is indebted to Prof. W. O. Crosby of the Massachusetts Institute of Technology for the gift of a suite of rocks and fossils, the latter illustrating methods of fossilization. Specimens have also been received from Professor Palache. The gift of a collection of coral reef and phosphate rock from Ocean or Banaba Island, lat. 52° S., long. 169° 53′ E., Pacific Ocean, sent by Mr. Andrew F. Hall of that island, is gratefully acknowledged.

The Committee on the Josiah Dwight Whitney Scholarship (Professors Davis, Wolff, and Woodworth) recommended in June, 1907, that a scholarship of $200 be awarded to Mr. Frederick Henry Lahee, of Cambridge, Massachusetts, a student in Harvard College, for defraying his travelling expenses in Course S2 in Montana in the summer of 1907.

The annexed abstracts of the reports of the instructors set forth the condition of the several laboratories.

Prof. R. T. Jackson reports that Geology 11 was taken by 4 students ; Geology 15 by 3 students.

The teaching collections are in good condition, and have been materially increased and improved by the following specimens selected and purchased by Professor Jackson: from Dr. F. Krantz, 41 lots ; from R. F. Damon, 65 lots ; from James Lomax, 78 microscopic slides ; also from the Boston Society of Natural History, 70 specimens.

In the April recess a party of instructors and students visited Yorktown, Virginia, and secured an excellent representation from the rich fossil beds of that locality.

Professor Ward reports that the decrease in the number of students in the elementary course in Meteorology (Geology B), which was stated in last year's Report to be directly traceable to the assignment of the lectures to a late afternoon hour, has resulted, as was inevitable, in a falling off in the attendance of students upon the intermediate courses in Meteorology and Climatology. It does not appear wise, in the light of this experience, to continue to give the lectures in the elementary course at 3.30 P. M., and the Department has therefore voted that they shall hereafter come in the morning, as formerly. The students' meteorological observatory, on the roof of the Geological section of the Museum, has added greatly to the interest and value of the work done in Geology B. A considerable number of photo-

graphic enlargements, and of new weather maps, the latter enlarged for lecture purposes and illustrating special weather types, has been added to the teaching collection. Special attention has been paid to securing photographs and lantern slides of meteorological phenomena of recent occurrence. The collection of slides for use in the courses in Meteorology and Climatology is now well supplied. During the year two investigations carried out by students in the course Geology 20*e* (Advanced Climatology) have been published, as follows: Mean monthly and annual relative humidity charts of the United States, by Kenneth S. Johnson, '07, in the Report of the South African association for the advancement of science, 1906, 161–168; "Fog on the Newfoundland Banks, by C. T. Brodrick, '07, in the Monthly weather review, Vol. 35, 1907, 76–78. Professor Ward has completed the manuscript of his new book, Climate, for The Science series.

Professor Woodworth reports that with Professors Davis and Wolff he gave the lectures to the class in Geology 4, the laboratory and field work of which was carried on under his guidance by Messrs. Eggleston, Lahee, and F. H. Sawyer. It is felt by the instructors and the students in this course that the field parties should be split up into smaller groups. For some years these field parties have included thirty-two students, too many for the effective instruction which one man can give. All the available force which we have been able to command has been devoted to this work. Were the number of students reduced to ten, as is now the case in Course 5, a great gain would be made. To accomplish this reduction would require an increase in the number of assistants in Geology 4 during October and November from two men to six. It is probable that temporary field aids drawn from the graduate and other advanced students in geology could be provided for this work at a cost of $140. Course 5, the elements of historical geology, was given for the second time, with the assistance of Mr. Eggleston and the additional aid of Dr. Mansfield and Mr. Lahee in the field. The field localities chosen for this course lie as far away as Attleboro and Worcester, requiring an additional expenditure for transportation about equal to the fee of the course, but we believe the instructive quality of the localities amply repay the expenditure. Course 8 was given, as last year, with the aid of Dr. Mansfield in the field work. Course 16 was repeated, as in former years, without personally

guided field excursions. While this method of conducting field work is better for advanced students of a decided geological aptitude, it is doubtless true that many students who elect this course do not obtain that knowledge of the subject which they would have were they personally attended by an instructor in the field. One student in Course 20*c* completed the mapping of the felsites and basic flows south of North Attleboro, and a paper embodying a considerable advance in our knowledge of these subjects has been prepared for publication.

The teaching collection has been enriched by gifts of rocks from Tennessee by Mr. Chester W. Washburn; of rocks from the upper Mississippi valley by Mr. W. N. Johnstone, '09; of rocks from Colorado by Mr. J. W. Eggleston; of a copy of Lepsius's Geological map of Germany, and several minor accessions. During the April recess Professor Woodworth conducted a party from Course 5 to the Yorktown section in Virginia.

An additional storage case containing 98 trays was built and placed in the hall. A reading desk composed of olivine basalt in the form of a *metate*, or native Mexican corn mill, with its hand roll, or *metapile*, was brought from Mexico by Professor Woodworth and installed in the Geological laboratory. An enlarged photograph of Professor Shaler by Pach has been placed in the Geological laboratory. Several instructors from other universities have during the year visited this laboratory and indicated their intention of embodying certain features in laboratories about to be constructed, as at Princeton, Columbus, Ohio, etc.

Mr. Eggleston spent five days in September, 1906, in an examination of the syenite at Cuttingsville, Vt.

Professor Woodworth continued his connection with the New York State geological survey and has completed a map and report on the pleistocene geology of the Schuylerville quadrangle, including the major part of the battlefield of Saratoga. In July, 1907, he took part in conducting members of Section E of the American association for the advancement of science to various points of interest between Covey Hill, Canada, and the Ausable Chasm.

Professor Johnson reports that the summer of 1906 was spent in conducting a geological excursion through portions of New Mexico, Arizona, and Utah. After making an examination for the Atchison, Topeka, and Santa Fé Railway Company of the underground water resources along a portion of their line in New Mexico, and studying the volcanic features of the Mount

Taylor district in the same territory, the party proceeded to Prescott, Arizona. From this point a wagon trip of fifteen hundred miles was made through the Grand Canyon district of Arizona and the Basin regions of Arizona and Utah, the excursion terminating at Salt Lake City.

During the winter considerable time was devoted to the preparation of articles based on the summer's work. The following subjects were treated: the volcanic necks of the Mount Taylor region, the faults and folds of the Grand Canyon district, recent volcanic activity in the San Francisco mountains, and physiographic features along the western margin of the High Plateaus of Utah. Reports on the volcanic necks of the Mount Taylor region were presented at a meeting of the American Academy in Boston and at the winter meeting of the Geological Society of America in New York; also reports on the texture of topography and its origin, and on the origin of beach cusps (read by title), at the meeting of the Association of American geographers in New York. Several public lectures on the western excursion were given during the year.

Professor Johnson continued to give instruction in the Geological department of the Massachusetts Institute of Technology throughout the year. In Harvard University he gave two courses, Geology A and Geology 6. The plan of instruction in these courses remained practically unchanged, except that in Geology 6 a regular system of conferences with individual students, at stated intervals, was instituted.

The Geographical laboratory equipment has been augmented by the purchase of ten new desks for use by the students. The laboratory exercises in Geology A have been revised, new exercises added, and a large number of new maps purchased.

An elementary summer course in the Physiography of the Lands was given by Professor Johnson, assisted by Mr. E. J. Saunders, to a class of ten persons. In connection with this work several excursions were made, including one to the Berkshire Hills and another to the White Mountains.

Dr. Mansfield reports that the work in Course 22 consisted in the first half-year of the geological mapping of an area and in the second half-year of special field problems. The Course Mining 28, a half course in field geology and geological surveying, given to students in the Division of Mining and Metallurgy, was completed by eight students, whose field work comprised the

preparation of a geological map of the Middlesex Fells on a scale of 500 feet to the inch, which map, together with field notes, reports, and specimens, has been filed in the Laboratory of advanced geology. The working facilities of this Laboratory have been improved by the addition of a storage case and by the addition of numerous specimens to the working collection of rocks illustrating the geology of the Metropolitan District. Dr. Mansfield spent the summer in Montana, in the Bridger Range, as instructor in charge of Geology S2, and later in the Crazy Mountains, as assistant to Professor Wolff.

Dr. Mansfield's thesis on Conglomerates has been published in a Bulletin of the Museum, and a separate paper of a didactic character has been prepared for publication in the Journal of geology. Considerable time was given during the year to the laboratory and field work in elementary courses.

Publications. August 1, 1906–*July* 31, 1907.

D. W. Johnson.

Report on a geological excursion through New Mexico, Arizona, and Utah, summer of 1906. *Technology quart.*, December, 1906, vol. 19, p. 408–415.

Drainage modifications in the Tallulah district. *Proc. Bost. soc. nat. hist.*, February, 1907, vol. 33, p. 211–248, pls. 27–28.

River capture in the Tallulah district, Georgia. *Science*, 15 March, 1907, new ser., vol. 25, p. 428–432. Separate, 10 pp.

A recent volcano in the San Francisco mountain region, Arizona. *Bull. Geogr. soc. Phil.*, July, 1907, vol. 5, p. 6–11, 2 pls.

Volcanic necks of the Mount Taylor region, New Mexico. *Bull. Geol. soc. Amer.*, July, 1907, vol. 18, p. 303–324, pls. 25–30.

Reviews in *Amer. nat.*, *Science*, *and Bulletin Amer. geogr. society.*

G. R. Mansfield.

The origin and structure of the Roxbury conglomerate. *Bull. M. C. Z.*, November, 1906, vol. 49, p. 89–271, 7 pls.

R. DeC. Ward.

The characteristics of the zones. I. The tropics. *Journ. geogr.*, 1906, vol. 5: September, p. 302–319. II. The temperate zones. *Loc. cit.*, October, p. 337–353; November, p. 375–405. III. The polar zones. *Loc. cit.*, December, p. 433–450.

Changes of climate. *Popular sci. monthly*, November, 1906, vol. 69, p. 459–470.

Les changements du climat. *Ciel et terre*, 1907, vol. 27: January, p. 559–567; February, p. 617–631.

Notes and reviews in *Science*, and in the *Bulletin Amer. geogr. society*.

J. B. Woodworth.

A 1671 version of Nicolaus Steno's De solido intra solidum naturaliter contento, by H. O. *Science*, 10 May, 1907, new ser., vol. 25 p. 738–739. Separate, 3 pp.

Postglacial faults in eastern New York. *Bull.* 107 *N. Y. state museum*, 1907, p. 5–28.

REPORT ON THE MAMMALS.

By Outram Bangs.

During the past year but few specimens have been added to the study series of mammals. One fine collection made in Middle Lower California by Mr. W. W. Brown, Jr., has been presented by John E. Thayer, Esq. Acknowledgment for acceptable specimens is also due to Messrs. Thomas Barbour, H. B. Bigelow, W. E. Castle, A. P. Morse, George Nelson, and T. E. Proctor.

Considerable material has been loaned to a number of systematists, including our entire series of hares and rabbits to Mr. E. W. Nelson of the U. S. Biological Survey.

Publications. August 1, 1906–*July* 31, 1907.

John E. Thayer and Outram Bangs.

A new race of the Californian thrasher from Lower California. *Proc. N. E. zoöl club*, 30 April, 1907, vol. 4, p. 17–18.

Birds collected by W. W. Brown, Jr., on Cerros, San Benito, and Natividad islands, in the spring of 1906, with notes on the biota of the islands. *Condor*, May, 1907, vol. 9, p. 77–81.

Another hybrid hummingbird — *Selasphorus rufus* + *Atthis calliope* — from California. *Auk*, July, 1907, vol. 24, p. 312–313.

Outram Bangs.

On the wood rails, genus Aramides, occurring north of Panama. *Amer. nat.*, March, 1907, vol. 41, p. 177–187.

A new race of the Hepatic tanager. *Proc. Biol. soc. Washington*, 27 March, 1907, vol. 20, p. 29–30.

An owl, *Rhinoptynx clamator* (Vieill.), added to the Costa Rican ornis. *Proc. Biol. soc. Washington*, 27 March, 1907, vol. 20, p. 31–32.

A new race of the Mangrove cuckoo, from Grenada and the Grenadines. *Proc. Biol. soc. Washington*, 18 April, 1907, vol. 20, p. 53–54.

A new spiny-tail from the Sierra Nevada de Santa Marta, Colombia. *Proc Biol. soc. Washington*, 18 April, 1907, vol. 20, p. 55–56.

On a collection of birds from western Costa Rica. *Auk*, July, 1907, vol. 24, p. 287–312.

REPORT ON THE BIRDS.

By William Brewster.

The more noteworthy additions to the Ornithological department consist of five hundred and eighty-five skins and twenty-seven sets of nests and eggs presented by Mr. A. Henry Higginson; two hundred and sixty-three skins of birds taken in California and Arizona, seventeen mounted albino birds, and a pair of Ridgway's Quail, the gift of Mr. John E. Thayer; eighty-three skins from Mr. E. L. Moseley's collecting, in large part during his connection with the Steere Expedition to the Philippines, received from Samuel Henshaw; and thirty birds, either mounted or skins taken in Iceland, given by Messrs. J. W. Hastings and L. J. de G. de Milhau. For other acceptable material, acknowledgments are due Mrs. C. L. Bullens, Mrs. E. H. Hall, Miss Pauline Garman, and Messrs. Outram Bangs, Thomas Barbour, H. B. Bigelow, William Brewster, Owen Bryant, L. J. Cole, C. B. Davenport, E. N. Fischer, Henry Hales, J. R. Mann, H. W. Miller, and George Nelson. Some work has been done in the arrangement of the nests and eggs and of the skeletons. The Exhibition case of North American Passeres has been rearranged; also the general collection of skins in the families Mniotiltidae, Fringillidae, Tanagridae, Icteridae, and following the Sharpe Hand List the Bubonidae to the Cypselidae inclusive.

In past reports I have made repeated mention of the Bryant collection of birds. All the North American birds contained in this large and extremely valuable collection have been examined, relabelled, and in large part catalogued.

Publications. August 1, 1906–*July* 31, 1907.

Concerning certain supposed instances of the occurrence of the Cinnamon teal in Florida and South Carolina. *Auk*, April, 1907, vol. 24, p. 154–157.

Notes on the Black rail of California. *Auk*, April, 1907, vol. 24, p. 205–210.

Aggressive screech owls. *Auk*, April, 1907, vol. 24, p. 215–217.

Breeding of the Rough-winged swallow in Berkshire county, Massachusetts. *Auk*, April, 1907, vol. 24, p. 221–222.

REPORT ON THE REPTILES, BATRACHIANS, AND FISHES.

By Samuel Garman.

For these departments there is to be reported as accessions a collection of fishes of the Philippine Islands through the Smithsonian Institution, comprehensive series of East Indian species of reptiles from the collections of Mr. Thomas Barbour, important representations of insular species of the Pacific from John E. Thayer, Esq., and a number of desiderata for exhibition purposes from the New York Zoölogical Society through Mr. W. T. Hornaday and Mr. R. L. Ditmars. Other lots of varying extent were given by Messrs. Outram Bangs and Thomas Barbour, Dr. H. B. Bigelow, Messrs. W. W. Dodge, and E. N. Fischer, Professor T. G. Lee, Dr. Wm. M. Woodworth, and Señor Don José C. Zeledon.

Purchases of Central American reptiles were made from Mr. E. C. Post, of Hawaiian and Bahaman fishes from Mr. Sherman F. Denton, and of different species of Plagiostomes for study and for the exhibition rooms.

There has been a comparatively small amount of loss from breakage, leakage, or evaporation.

Besides the routine work, preparations for publication have been steadily continued.

REPORT ON THE ENTOMOLOGICAL DEPARTMENT.

The Departmental collections have been enriched by contributions from Miss E. B. Bryant, Messrs. Outram Bangs, Thomas Barbour, Frederick Blanchard, Walter Deane, J. H. Emerton, W. G. Farlow, C. W. Johnson, E. M. Keyser, Theodore Lyman, A. P. Morse, E. C. Post, F. W. Putnam, J. D. Sherman, Roland Thaxter, J. E. Thayer, J. B. Williams, and E. B. Williamson.

To Messrs. E. A. Back, Nathan Banks, H. T. Fernald, H. J. Franklin, A. D. Hopkins, G. W. Peckham, and J. D. Sherman we are indebted for their study of our material. Dr. Fernald's results are embodied in Bulletin M. C. Z., vol. 50, no. 9.

Progress in the identification and rearrangement of the collections has been made with the scorpions and myriopods, and also with portions of the Noctuidae, Cicindelidae, and Carabidae. A considerable part of the Roland Hayward collection of North American Coleoptera has been labelled and incorporated with the general collection.

REPORT ON THE CRUSTACEA AND MOLLUSCA.

By Walter Faxon.

The only notable contribution to the collection of Crustacea during the current year consists of a series of 81 species and subspecies received from the U. S. National Museum. Miss E. B. Bryant has catalogued the valuable collection of land shells received from Mr. H. W. Winkley. These shells, 2,086 numbers in the Museum catalogue, have been distributed in the general collection. The intercalation of such a large amount of new material involves considerable change of "outside" labels, a piece of work which still remains to be done.

REPORT ON THE WORMS.

By W. McM. Woodworth.

The most extensive addition to the collections during the past year is the material collected by Mr. Agassiz during his cruise through the West Indies in the "Virginia." This material is of especial interest as it consists almost exclusively of pelagic forms. Other material has been received from Mr. O. Bangs and Prof. R. Thaxter. Material was loaned to Drs. K. J. Bush and J. P. Moore.

Publication. August 1, 1906–*July* 31, 1907.

The Palolo worm, *Eunice viridis* (Gray). *Bull. M. C. Z.*, May, 1907, vol. 51, p. 1–22, 3 pls.

REPORTS ON THE LOWER INVERTEBRATES.

ECHINODERMS.

By Hubert Lyman Clark.

The labelling and cataloguing of the collections of echinoderms has occupied the greater part of the year. The card catalogue of the starfishes was completed in the winter and showed a collection of 10,400 specimens, representing 85 genera and 344 species. Additions during the spring, chiefly by exchange, have increased these numbers, so that at the close of the year there were 93 genera and 387 species in the collection. The catalogue of the sea-urchins was begun and three families (Cidaridae, Saleniidae, Arbaciidae) were completed; these families are represented by 18 genera, 64 species, and 2,138 specimens.

In November a List of echinoderms available for exchange was sent to 24 museums. Responses were quite satisfactory, and exchanges have been carried through with the U. S. National Museum (Washington), the Museum of Leland Stanford, Jr. University (Palo Alto, Cal.), the British Museum (London), the Museum d'Histoire Naturelle (Paris), the Zoologiske Museum (Copenhagen), the Australian National Museum (Sydney), and the Otago University Museum (Dunedin, New Zealand). About 550 specimens were involved in these exchanges, and our material available for exchange of 25 most desirable species, chiefly from the "Blake" and "Albatross" dredgings, has been exhausted.

Aside from these exchanges, the only addition to the collection is a series of Cidaridae, chiefly from the Hawaiian Islands and Japan, presented by the U. S. National Museum, in return for the identification of the extensive collections made in the Pacific Ocean by the "Albatross." The series contains 196 specimens, of 22 species and 12 genera, and includes cotypes of 9 recently described species.

Publications. August 1, 1906 — *July* 31, 1907.

Alexander Agassiz *and* Hubert Lyman Clark.

Hawaiian and other Pacific Echini. The Cidaridae. *Mem. M. C. Z.*, February, 1907, vol. 34, 50 pp., 44 pls.

Preliminary report on the Echini collected in 1902, among the Hawaiian Islands, by the U. S. Fish Commission Steamer "Albatross." *Bull. M. C. Z.*, March, 1907, vol. 50, p. 229–260.

Hubert Lyman Clark.

The birds of Amherst and vicinity. Second edition. Amherst, 1906. [March, 1907.] 104 pp.

The starfishes of the genus Heliaster. *Bull. M. C. Z.*, June, 1907, vol. 51, p. 23–76, pl. 1–8.

Recent literature on echinoderms. *Science*, 5 July, 1907, new ser., vol. 26, p. 12–17.

ACALEPHS.

By Henry B. Bigelow.

The most important accession received during the year is the collection made by Mr. Agassiz on his expedition to the West Indies on the steam yacht "Virginia." This material contains many genera both of Medusae and Siphonophoræ previously unrepresented in the Museum. The following gifts have been received: from Mr. Thomas Barbour, Olindias and two genera of rhizostomes from the Dutch East Indies; from Dr. John Bryant, Jr., Lucernaria from Labrador, Mr. Owen Bryant, several specimens each of Sarsia, *Cyanea arctica*, and *Mertensia ovum* from Newfoundland; from Dr. H. L. Clark, Haliclystus, and cotypes of *Charybdea xaymacana*, and *Tripedalia cystophora* Conant, from Jamaica; from Professor G. H. Parker, *Gonionemus murbachi*, and several specimens of *Aequorea tenuis* from Woods Hole. The Assistant, also, has collected specimens of Sarsia, Melicertum, and Aurelia.

From February until April, 1907 I accompanied Mr. Agassiz as one of his Assistants on his expedition to the West Indies. The remainder of the year I have devoted chiefly to my report on the Medusae collected by the expedition of the "Albatross" to the Eastern Tropical Pacific in 1904–05.

REPORT ON THE DEPARTMENT OF VERTEBRATE PALAEONTOLOGY.

By Charles R. Eastman.

Research work during the past year has included a reinvestigation of Devonic fishes of the Ohioan and Dakotan provinces, with partial publication of results, and the preparation of materials for a study of the Mississippian Palaeozoic fishes, principally from Kentucky, an area that has been but little exploited. A few interesting types of Tertiary cetaceans have been described by Dr. F. W. True, and by the Assistant.

Part of the month of April, 1907, was spent in the field for the purpose of studying the stratigraphy and gathering further material from the Devonian and Lower Carboniferous in central Kentucky. Scant incidental notices have been published concerning the vertebrate content of the fossiliferous horizons of this State, although during the early days of the Geological Survey a considerable quantity of material was accumulated. Some of the original material upon which these notices were based, in particular a selected lot of specimens formerly belonging to Messrs. W. T. Knott, W. M. Linney, and Professor J. C. Fales, has been acquired by the Museum, either through purchase or donation. In addition, an extensive series of fossiliferous phosphatic nodules from the base of the Waverly, near Junction City, in Boyle County, was collected by the Assistant in company with Mr. Moritz Fischer, the contents of which afford a new and interesting field for investigation. Not the least interesting feature of the remarkable assemblage here represented is the presence of undoubted arthrodiran and ptyctodont remains. The only similar manifestations in rocks of post-Devonic age are in the Kinderhook of Iowa and Jefferson County, Missouri. Some of the crustacean remains have been submitted to Dr. J. M. Clarke for report, and the fossil wood has been placed in the hands of Dr. E. C. Jeffrey. More recently, our representation from the same region has been in-

creased through exchange with the Peabody Museum at Yale University, the material in question being from the so-called New Albany (= Genesee) Black Shale near Louisville, Kentucky.

Following is a list of the accessions and publications during the present year.

Additions to the Collection.

Small clupeoid from the Green River Eocene of Wyoming, received through Mr. S. Henshaw, Dec. 8, 1906.

A large assortment of fish-bearing nodules from the base of the Waverly, near Junction City, Kentucky, collected by Mr. Moritz Fischer conjointly with the Assistant in April, 1907.

A small lot of fish-remains from the same locality as the last, and others in the vicinity, collected a number of years ago by Prof. J. C. Fales, of Danville, Kentucky, and presented by him to the Museum.

A second small lot similar to the preceding, some of them referred to in W. M. Linney's "Notes on the Rocks of Central Kentucky," (1882). Purchased.

About fifty specimens of Devonian and Lower Carboniferous fish-remains formerly in the collection of W. T. Knott, and mentioned in his "Report on the Geology of Marion County" (1885). Purchased.

A number of Genesee fish-remains from the vicinity of Louisville, Kentucky, collected in 1867 by W. N. Longworth, from whom they were obtained by Prof. O. C. Marsh. Received through exchange with the Peabody Museum, Yale University.

Cast of type specimen of *Glyptaspis abbreviata*, presented by Dr. J. M. Clarke.

Gutta-percha replica of dermal ossifications associated with the complete dentition of Rhynchodus in the Upper Devonian of Wildungen, Waldeck, and interpreted by Dr. Otto Jaekel as the "shoulder-girdle of Rhamphodus." Presented by Dr. Jaekel.

Publications. August 1, 1906–*July* 31, 1907.

Disputed Vesuvian eruptions. *Science*, 31 August, 1906, new ser., vol. 24, p. 284–286.

Sharks' teeth and cetacean bones [from the Eastern Tropical Pacific]. *Bull. M.C. Z.*, November, 1906, vol. 50, p. 73–98, pl. 1–4.

Notes on the history of natural science. *Science*, 21 December, 1906, new ser., vol. 24, p. 822–823.

Vesuvius during the early middle ages: *Pop. sci. month.*, December, 1906, vol. 69, p. 558–566.

Mylostomid dentition. *Bull. M. C. Z.*, February, 1907, vol. 50, p. 209–228, 1 pl.

Types of fossil cetaceans in the Museum of Comparative Zoölogy. *Bull. M. C. Z.*, June, 1907, vol. 51, p. 77–94, pl. 1–4.

Devonic fishes of the New York formations. *Mem.* 10 *N. Y. state mus.*, 1907, 235 pp., pl. 1–5.

Les éruptions du Vésuve au moyen-âge. *Rev. scient.*, 1907, ser. 5, vol. 7, p. 37–42.

REPORT ON THE LIBRARY.

During the year from August 1, 1906, to July 31, 1907, inclusive, 1,097 volumes, 2,043 parts of volumes, and 1,704 pamphlets have been added to the Library.

From the library of the late Mr. G. H. Eldridge, Mrs. Eldridge has kindly given a large number of geological books and pamphlets. To Dr. J. C. Phillips the Library is indebted for an excellent copy of Audubon's Birds of America, 4 volumes, folio, 435 plates (1827–38) with the accompanying text, issued as Ornithological biography, 5 volumes (1831–39). Mr. John E. Thayer has most generously presented the original ledgers, day books, and account books, with the list of subscribers kept by J. J. Audubon and his sons during the publication of their works on the birds and mammals of North America, seven volumes of great bibliographic interest.

We have acquired plaster busts of Carl Linné (1707–1778) by John Borjeson (1907) and of Carl Gegenbaur (1826–1903) by C. Seffner (1906).

The total number of volumes in the Library is 43,518, the total number of pamphlets is 38,026.

Three hundred and twenty volumes have been bound; three hundred pamphlets have been separately bound.

[A]

PUBLICATIONS

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

FOR THE YEAR 1906–1907.

Bulletin: —

Vol. XLIII.

No. 5. Reports on the Results of Dredging, under the Supervision of Alexander Agassiz, in the Gulf of Mexico and the Caribbean Sea, and on the East Coast of the United States, 1877 to 1880, by the U. S. Coast Survey Steamer "Blake," Lieut. Commander C. D. Sigsbee, U. S. N., and Commander J. R. Bartlett, U. S. N., Commanding. XLIII. Eine neue Myzostoma-Art. Von August Reichensperger. pp. 6. December, 1906.

Vol. XLIX. (Geological Series, Vol. VIII.)

No. 4. The origin and structure of the Roxbury conglomerate. By George Rogers Mansfield. pp. 183. 7 Plates. November, 1906.

Vol. L.

No. 3. Reports on the Scientific Results of the Expedition to the Eastern Tropical Pacific, in Charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut. Commander L. M. Garrett, U. S. N., Commanding. VI. Madreporaria. By T. Wayland Vaughan. pp. 14. 10 Plates. August, 1906.

No. 4. Reports on the Scientific Results of the Expedition to the Eastern Tropical Pacific, in Charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut. Commander L. M. Garrett, U. S. N., Commanding. VII. Sharks' teeth and cetacean bones. By C. R. Eastman. pp. 26. 4 Plates. November, 1906.

No. 5. Vertebrata from Yucatan. By Glover M. Allen, Thomas Barbour, and Leon J. Cole. pp. 62. 2 Plates. November, 1906.

No. 6. Reports on the Scientific Results of the Expedition to the Eastern Tropical Pacific, in Charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut. Commander L. M. Garrett, U. S. N., Commanding. IX. New species of Dinoflagellates. By Charles Atwood Kofoid. pp. 48. 18 Plates. February, 1907.

No. 7. Mylostomid dentition. By C. R. Eastman. pp. 20. 1 Plate. February, 1907.

No. 8. Preliminary Report on the Echini collected in 1902, among the Hawaiian Islands, by the U. S. Fish Commission Steamer "Albatross," in Charge of Commander Chauncey Thomas, U. S. N., Commanding. By Alexander Agassiz and Hubert Lyman Clark. pp. 32. March, 1907.

No. 9. A collection of Sphecidae from Argentine. By H. T. Fernald. pp. 12. May, 1907.

Vol. LI.

No. 1. The Palolo worm, *Eunice viridis* (Gray). By W. McM. Woodworth. pp. 22. 3 Plates. May, 1907.

No. 2. The starfishes of the genus Heliaster. By Hubert Lyman Clark. pp. 54. 8 Plates. June, 1907.

No. 3. Types of fossil cetaceans in the Museum of Comparative Zoölogy. By C. R. Eastman. pp. 18. 4 Plates. June, 1907.

No. 4. Observations on the type specimen of the fossil cetacean *Anoplonassa forcipata* Cope. By Frederick W. True. pp. 12. 3 Plates. July, 1907.

Memoirs: —

Vol. XXX.

No. 3. Reports on an Exploration off the West Coasts of Mexico, Central and South America, and off the Galapagos Islands, in Charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," during 1891, Lieut. Commander Z. L. Tanner, U. S. N., Commanding. XXXVI. Ein Beitrag zur Morphologie des Tiefseefischgehirnes. Von Emanuel Trojan. pp. 42. 6 Plates. October, 1906.

Vol. XXXIV.

No. 1. Hawaiian and other Pacific Echini. The Cidaridae. By Alexander Agassiz and Hubert Lyman Clark. pp. 50. 44 Plates. February, 1907.

Vol. XXXV.

No. 1. Reports on the Scientific Results of the Expedition to the Eastern Tropical Pacific, in Charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut. Commander L. M. Garrett, U. S. N., Commanding. VIII. The Hydroids. By Samuel F. Clarke. pp. 20. 15 Plates. February, 1907.

Report: —

1905–1906. pp. 37. 3 Plates. December, 1906.

[B]

INVESTED FUNDS OF THE MUSEUM.

In the Hands of the Treasurer of Harvard College.

Sturgis-Hooper Fund	$108,087.41
Gray Fund	50,000.00
Agassiz Memorial Fund	297,933.10
Teachers and Pupils Fund	7,594.01
Permanent Fund	117,469.34
Humboldt Fund	7,740.66
Virginia Barret Gibbs Fund	5,841.28
Willard Peele Hunnewell Memorial Fund	5,000.00
Maria Whitney Fund	5,000.00
	$604,665.80

The payments on account of the Museum are made by the Bursar of Harvard College, on vouchers approved by the Curator. The accounts are annually examined by a committee of the Overseers. The only funds the income of which is restricted, the Gray, the Humboldt, and the Maria Whitney Funds, are annually charged in an analysis of the accounts, with vouchers to the payment of which the income is applicable.

The income of the Gray Fund can be applied to the purchase and maintenance of collections, but not for salaries.

The income of the Humboldt Fund (about $300) can be applied for the benefit of one or more students of Natural History, either at the Museum, the United States Fish Commission Station at Woods Hole, the Stations at Bermuda, or the Tortugas.

The income of the Virginia Barret Gibbs Scholarship Fund, of the value of $250, is assigned annually with the approval of the Faculty of the Museum, on the recommendation of the Professors of Zoölogy and of Comparative Anatomy in Harvard University, "in supporting or assisting to support one or more students who may have shown decided talents in Zoölogy, and preferably in the direction of Marine Zoölogy."

The income of the Maria Whitney Fund can be applied for the care (binding) and increase of the Whitney Library.

Applications for the tables reserved for advanced students at the Woods Hole Station should be made to the Faculty of the Museum before the 1st of May. Applicants should state their qualifications, and indicate the course of study they intend to pursue.

The following Publications of the Museum of Comparative Zoölogy are in preparation: —

LOUIS CABOT. Immature State of the Odonata, Part IV.
E. L. MARK. Studies on Lepidosteus, continued.
" On Arachnactis.
AGASSIZ and WHITMAN. Pelagic Fishes. Part II., with 14 Plates.
A. AGASSIZ and H. L. CLARK. The "Albatross" Hawaiian Echini.
S. GARMAN. The Plagiostomes.

Reports on the Results of Dredging Operations in 1877, 1878, 1879, and 1880, in charge of ALEXANDER AGASSIZ, by the U. S. Coast Survey Steamer "Blake," as follows: —

C. HARTLAUB. The Comatulae of the "Blake," with 15 Plates.
H. LUDWIG. The Genus Pentacrinus.
A. MILNE EDWARDS and E. L. BOUVIER. The Crustacea of the "Blake."
A. E. VERRILL. The Alcyonaria of the "Blake."

Reports on the Results of the Expedition of 1891 of the U. S. Fish Commission Steamer "Albatross," Lieutenant Commander Z. L. TANNER, U. S. N., Commanding, in charge of ALEXANDER AGASSIZ, as follows: —

A. AGASSIZ. The Pelagic Fauna.
" The Panamic Deep-Sea Fauna.
H. B. BIGELOW. The Siphonophores.
K. BRANDT. The Sagittae.
" The Thalassicolae.
W. R. COE. The Nemerteans.
W. H. DALL. The Mollusks.
REINHARD DOHRN. The Eyes of Deep-Sea Crustacea.
H. J. HANSEN. The Cirripeds.
" The Schizopods.
HAROLD HEATH. Solenogaster.
W. A. HERDMAN. The Ascidians.
S. J. HICKSON. The Antipathids.
—— The Actinarians.
E. L. MARK. Branchiocerianthus.
JOHN MURRAY. The Bottom Specimens.
P. SCHIEMENZ. The Pteropods and Heteropods.
THEO. STUDER. The Alcyonarians.
—— The Salpidae and Doliolidae.
H. B. WARD. The Sipunculids.
W. McM. WOODWORTH. The Annelids.

Reports on the Scientific Results of the Expedition to the Tropical Pacific, in charge of ALEXANDER AGASSIZ, on the U. S. Fish Commission Steamer "Albatross," from August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., Commanding, as follows: —

A. AGASSIZ. The Echini.
F. E. BEDDARD. The Earthworms.
W. H. DALL. The Mollusks.
—— The Volcanic Rocks.
—— The Coralliferous Limestones.
J. M. FLINT. The Foraminifera and Radiolaria.
S. HENSHAW and A. G. MAYER. The Insects.
R. LENDENFELD and F. URBAN. The Siliceous Sponges.
H. LUDWIG. The Starfishes and Ophiurans.
K. MITSUKURI. The Holothurians.
G. W. MÜLLER. The Ostracods.
JOHN MURRAY. The Bottom Specimens.
MARY J. RATHBUN. The Crustacea Decapoda.
RICHARD RATHBUN. The Hydrocorallidae.
G. O. SARS. The Copepods.
L. STEJNEGER. The Reptiles.
C. H. TOWNSEND. The Mammals, Birds, and Fishes.
T. W. VAUGHAN. The Corals, Recent and Fossil.
W. McM. WOODWORTH. The Annelids.

PUBLICATIONS

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

AT HARVARD COLLEGE.

There have been published of the BULLETIN Vols. I. to XLII., and also Vols. XLIV. to XLVIII., and L.; of the MEMOIRS, Vols. I. to XXIV., and also Vols. XXVIII., XXIX., XXXI. to XXXIII.

Vols. XLIII., XLIX., LI., and LII. of the BULLETIN, and Vols. XXV., XXVI., XXVII., XXX., XXXIV., XXXV., XXXVI., XXXVII., and XXXVIII. of the MEMOIRS, are now in course of publication.

The BULLETIN and MEMOIRS are devoted to the publication of original work by the Professors and Assistants of the Museum, of investigations carried on by students and others in the different Laboratories of Natural History, and of work by specialists based upon the Museum Collections and Explorations.

The following publications are in preparation: —

Reports on the Results of Dredging Operations from 1877 to 1880, in charge of Alexander Agassiz, by the U. S. Coast Survey Steamer "Blake," Lieut. Commander C. D. Sigsbee, U. S. N., and Commander J. R. Bartlett, U. S. N., Commanding.

Reports on the Results of the Expedition of 1891 of the U. S. Fish Commission Steamer "Albatross," Lieut. Commander Z. L. Tanner, U. S. N., Commanding, in charge of Alexander Agassiz.

Reports on the Scientific Results of the Expedition to the Tropical Pacific, in charge of Alexander Agassiz, on the U. S. Fish Commission Steamer "Albatross," from August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., Commanding.

Reports on the Scientific Results of the Expedition to the Eastern Pacific, in charge of Alexander Agassiz, on the U. S. Fish Commission Steamer "Albatross," from October, 1904, to April, 1905, Lieut. Commander L. M. Garrett, U. S. N., Commanding.

Contributions from the Zoölogical Laboratory, Professor E. L. Mark, Director.

Contributions from the Geological Laboratory.

These publications are issued in numbers at irregular intervals; one volume of the Bulletin (8vo) and half a volume of the Memoirs (4to) usually appear annually. Each number of the Bulletin and of the Memoirs is sold separately. A price list of the publications of the Museum will be sent on application to the Librarian of the Museum of Comparative Zoölogy, Cambridge, Mass.